28. A STUDY ON BUTTERFLY POPULATIONS AT GUINDY NATIONAL PARK, MADRAS

(With a text-figure)

Introduction

Many species of animals are known to show seasonal fluctuations in their numbers and densities (Begon and Mortimer 1986, Young 1982, Davidson and Andrewartha 1948). This makes some species common during some parts of the year and less common at other times. These seasonal variations in population sizes might be due to several natural factors like their breeding cycles, seasonal movements across habitats, availability of food, etc. (Erlich 1986). Understanding such fluctuations in animal populations can help in their management and conservation as was shown in case of the whaling industry (May 1980).

Study Site

Guindy National park is a 2.7 Sq. Km dry evergreen scrub forest in the heart of Madras city. The vegetation of the park, based on the major species composition can be classified into five kinds (Rajasekhar 1992a). However in the present study, only two basic types, the dense woodland covering about one third the park area and the second, open scrub forest habitat covering most of the park have been recognised. The major fauna of the park include the Spotted Deer (*Axis axis*), Blackbuck (*Antilope cervicapra*), Jackals (*Canis aureus*), a few other small mammals and reptiles. Over 120 species of birds have been recorded over the past two years in the park (Rajasekhar 1992b).

Methods

Regular marked trails in both, the dense woodland and in the open scrub habitat were traversed in the mornings and evenings, once every month of the year 1991. All butterflies sighted were identified and recorded. The identifications were based on direct visual observations and no captures were made. Identifications were confirmed from Satyamurti's Catalogue of the butterflies at the Madras Museum and from captures made in other unprotected green pockets in the city.

The year was divided into four seasons based on general observations on the climate and all butterfly sightings over each of the three months were pooled together for analysis. March to May was the peak dry season with most of the vegetation dry and defoliated. The first wet season from June to August receives scanty rainfall through the South West monsoon. The next three months from September to November were the second wet season and most of the year rainfall comes now from the North East monsoon. The post monsoon season from December to February are relatively cooler months of the year with some occasional showers.

Since sampling effort in the four seasons was unequal, only relative estimates of the abundance were possible. Data on the Emigrants (*Catopsilia* sp.) was discarded from analyses due to discrepancies in identification. Based on the relative abundance estimates, the butterflies were classified as follows,

Abundant: > 30%; Very Common: 20% — 30%; Common: 10% — 20%; Frequent: 5% — 10%; Occasional: 1% — 5%; Rare: < 1%.

The mean relative abundance values of all the counts in the two habitats were calculated for the different species in the four seasons. Differences between the means across the habitats were tested to determine any habitat preference by the butterflies.

Observations

The main observations have been detailed in Table 1, and in Figure 1. As is apparent from the figure and table many species of butterflies showed distinct seasonal fluctuations and in fact a few of them (6) were completely absent in some parts of the year. Though some species showed preference of habitats, none of them were completely restricted to any one habitat type. The number

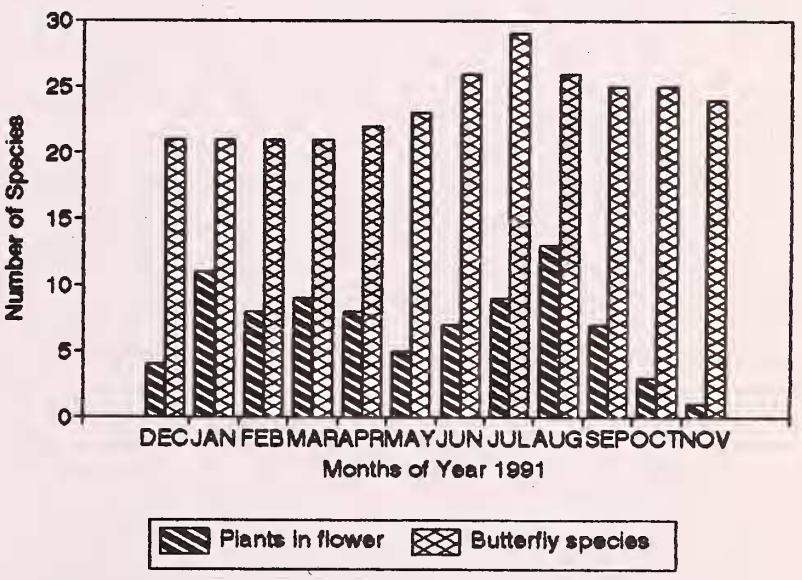

Fig. 1. Number of butterfly species and plants in flower seen each month.

TABLE 1

STATUS AND DISTRIBUTION OF BUTTERFLY SPECIES THROUGH THE FOUR SEASONS

Sl. No.	Species	Dec. Jan. Feb. Post monsoon	Mar. Apr. May Dry season	Jun. Jul. Aug. I wet season	Sep. Oct. Nov. II wet season
	PAPILIONIDAE				
1.	*Pachliopta hector*	Frequent *	Occasional *	Occasional $	Occasional $
2.	*P. aristolochiae*	Fequent *	Occasional	Occasional $	Rare
3.	*Papilio polytes*	Occasional *	Common *	Common $	Fequent $
4.	*Papilio demoleus*	Absent	Occasional	Common $	Frequent $
5.	*Pathysa nomius*	Absent	Absent	1 sighting	Absent
6.	*Graphium sarpedo*	Rare	Rare	Rare	Rare
	PIERIDAE				
7.	*Leptosia nina*	Occasional	Occasional	Rare	Rare
8.	*Delias eucharis*	Absent	Absent	Absent	Rare
9.	*Cepora nerissa*	Frequent	V. Common	Frequent $	Occasional
10.	*Colotis danae*	Absent	Absent	Rare	Absent
11.	*Ixias marianne*	Absent	Absent	Rare	Absent
12.	*I. pyrene*	Occasional	V. Common	Frequent *	Occasional *
13.	*Pareronia valeria*	Occasional *	Frequent	Rare *	Occasional
14.	*Catopsilia pomona*	!	!	!	!
15.	*C. crocale*	!	!	!	!
16.	*C. pyranthe*	!	!	!	!
17.	*Eurema blanda*	Common $	Frequent	Frequent *	Frequent $
18.	*E. hecabe*	@	@	@	@
	DANAIDAE				
19.	*Danaus genutia*	Occasional	Rare	Rare	Rare
20.	*D. chrysippus*	Occasional *	Frequent *	Rare	Occasional
21.	*Tirumala limniace*	Frequent $	Occasional	Frequent *	Occasional *
22.	*Parantica aglea*	@	@	@	@
23.	*Euploea core*	V. Common	Common *	Abundant *	Abuntant
	SATYRIDAE				
24.	*Mycalesis perseus*	!	!	!	!
25.	*Melantis leda*	!	!	!	!
	NYMPHALIDAE				
26.	*Neptis hylas*				Rare
27.	*Hypolimnas bolina*	Rare	Rare	Rare	Rare
28.	*H. misippus*	Rare	Rare	Rare	Rare
29.	*Junonia hierta*	Rare	Rare	Rare	Rare
30.	*J. orithya*	Rare	Occasional	Rare $	Occasional
31.	*J. lemonias*	Rare	Rare	Rare	Rare
32.	*J. alamana*	Absent	Absent	Rare	Rare
33.	*Precis iphita*	!	!	!	!
34.	*Vanessa cardui*			1 sighting	
35.	*Phalanta phalanta*	Frequent $	Occasional	Occasional $	Frequent $
36.	*Ariadne ariadne*	Rare	Rare	Rare	Occasional
37.	*Acraea terpsicore*	Common $	Frequent	Occasional $	Common $

@ Species of this genera indistinguishable in the field.

! Inconsistent data due to low detectability of species in the field.

Relative Abundance	Status
< 1%	Rare
1% — 5%	Occasional
5% — 10%	Frequent
10% — 20%	V. Common
20% — 30%	V .Common
> 30%	Abundant

Habitat preference	Habitat
*	Dense
$	Open scrub forest

of species seen every month varied between 21 to 29. The first wet season from June to August was perhaps the richest with as many as 29 species recorded in July alone. On the whole about 37 species of butterflies were recorded over the entire year. This excludes members of the families Lycaenidae and Hesperidae. However a few Lycaenids and Hesperids were identified from just visual observations in the field which are listed below.

The Common Pierrot (*Castalius rosimon*), The Southern Grass Jewel (*Zizeeria trochilus*), The Common Cerulean (*Jamides celeus*), The Indian Redflash (*Rapala melampus*) and the Indian Skipper (*Syrichtus galba*).

The Common Crow (*Euploea core*) was perhaps the most abundant species in the park throughout the year, while there were several species of butterflies that were seen just once over the entire year. About 40% of the species prefer the dense vegetation in the dry season while only 16% are relatively more abundant there in the wet season. On the other hand only 7% of the species were significantly more abundant, i.e. preferred the scrub vegetation in the dry season but in the wet season 50% of the species preferred the scrub habitat.

The number of butterfly species to the number of flowering plant species showed poor correlation (r= 0.07) over the 12 months of the year. However, data over the months from April to July gave a higher correlation (r=0.6), as can be seen in Fig. 1. Several species were also seen to breed in the park. The Common Emigrant (*Catopsilia crocale*) was seen laying eggs on young leaves of *Cassia* sp. in late May and early June. The Gull (*Cepora nerissa*) laid eggs on *Carissa spinarum,* a common scrub species of the park. The common species of the dense understorey vegetation, *Glycosmis cochinchinensis* was the host plant of the Mormon *(Papilio polytes).*

Discussions

Seasonal variations in the abundances of butterflies seem to be following the general trends in the vegetation. The first wet season from June to August which immediately follows the dry season brings many species of plants and trees into new flush and many species of the scrub set flower during this period (Rajasekhar 1992a). Some of the species flowering now are *Albizia lebbeck, Guazuana tomentosa, Syzigium cumini, Randia* sp., *Carissa sp., Cassia sp., Acacia leucophloea*, *Clausena dentata* and *Casealpinia coriera*. The last one, *Caesalpinia* sp. attracts butterflies in the hundreds, the Common Crow and the Blue Tiger being the most common visitors. However with the drying up of the vegetation in summer, most species retreat to the dense vegetation where there are some flowering species like *Acacia planifrons, Atlantia monophylla, Azadirachta indica,* etc. The only species that is common in the scrub even in the summer is the Gull (*Cepora nerissa*), which is perhaps active in the early hours of the day when the vegetation is moist in the dew. Of course, this does not mean that the other species are not seen in the scrub at all, but just that they are relatively more abundant in the dense habitat. More over since only relative estimates have been made, it is important to note that a species can become less common in one season even if its numbers have not significantly reduced, but due to an increase in abundance of some other species.

The absence of the common host plants of many of these butterflies in the park, like the host plant of the Common Tiger (*Danaus chrysippus*), *Calotropis gigantea* may have something to do with their abundances. Other host plants like *Passiflora* sp., *Nerium* sp., *Aristolochia* sp., *Polyalthia* sp., etc. are either absent or too few in numbers in the park. However since these species of plants are quite common in other parks and gardens in the city, many of the butterflies perhaps migrate locally to breed elsewhere, on these plants (Rajasekhar 1991). Perhaps this is why areas in Madras with more modified vegetation like the MCC campus have greater species richness (Dayanandan *et al.* 1978).

The absence of some species of butterflies like the Common Lime (*Papilio demoleus*) in some parts of the year can only be explained by such local migrations (Wynter-Blyth 1957). The other rarer species are perhaps occasional-stragglers like the Painted Lady which is known to undertake long migrations (Torben 1987), might have strayed into the park accidentally.

A more intensive study monitoring the absolute abundances of the butterfly species for consecutive years could give more insight to the butterfly population dynamics at the Guindy National Park. This study has established the presence of some sort of relationship between the abundance of butterflies and the vegetation characteristics. Not surprising that butterflies inspite of fitting few ecological niches, are good indicators of environmental changes (Daniels 1991). This is important to the management of the park considering that some of the species that occur here are Schedule I species.

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29. COMMENTS ON THE VARIATIONS IN *JUNONIA ORITHYA* COMPLEX (LEPIDOPTERA: NYMPHALIDAE)

(With two text-figures)

Introduction

According to Wynter-Blyth (1957) and Eliot (1992), the species referable to the genus *Junonia* Hubner are very susceptible to seasonal variations and in most part of their range, they occur in both wet and dry season forms. One of the species, *J. orithya* though is otherwise well known and unmistakable sorely needed revision (D'Abrera 1985). During the course of the present studies, some representative populations of the species, collected from different localities in North-West India have been examined to record variations. Besides updating the description of the species by recording some additional variations, comments have also been made on its male genitalia.

Observations

Some of the already known and presently observed variations of the species *J. orithya* are given in Table 1.

Owing to the variations within population of the individuals collected in the same or different seasons/ time of the year, we dissected as many as 16 males and 10 females of variable individuals from different localities. This was intended to confirm if all these individuals belong to the same species. The critical examination of the genitalia shows that one of the male specimens collected from Bajoura (Kulu, H.P. 1105 m) not only differs from the rest of the individuals of the species *J. orithya* collected from different localities but also from the closely allied individuals collected from the same locality on the same day at the same time. In the male genitalia of the Bajoura specimen (Fig. 1), the valvae (clasping organs) are relatively more strongly sclerotised. The cucullus has two well defined spines (compared to four in others), the costal margin is deeply incurved and the arrangement of the setae on the saccular margin is also different from *J. orithya* (Fig. 2). Besides, the transtilla of the Bajoura specimen is heavily setosed. Out of thirty six males, this is the only specimen in which the black ocellus in interspace 5 on the upperside of hindwing is completely ringed with orange and black.

According to D'Abrera (1984), *orithya* is represented by a subspecies *ocyale* Hubner with its distribution extending from India to Southern Burma. The naming of one of the sympatric populations at Bajoura (Kulu, H.P.) as a different subspecies is thus taxonomically not possible. However, inspite of all above mentioned variations, the lone specimen is not being named as a new species at the moment. The present study, however, confirms the view of D'Abrera (loc.cit.) that *orithya* is in need of revision. Further, it should be described under *Junonia* and not under *Precis* as has been done by Varshney (1990). The latter genus occurs only in Africa and the two genera are quite different from one another (Eliot 1992).

Material Examined: Himachal Pradesh: 1 male, 2 females, Rajgarh, 27. V.92; 1 male, Chambaghat, 28.V.92; 3 males, Nauni, 25.V.92; 1 male, Mcleodganj, 28.VI.92; 2 males, 3 females, Bhagsu Nag, 30.VI.92; 1 female,